

places with moderate or small rainfall, such as Campbell-pore, Poona, and Aden.

“In my opinion an all-sufficient reason for the rarity of the occurrence exists in the fact that in butterflies the edible matter is a minimum, while the inedible wings, etc., are a maximum.”

[See Proc. Zool. Soc. 1887, p. 210, where Lepidoptera and especially butterflies are spoken of in almost exactly these terms, as a suggested explanation of the fact that lizards, although they eat them, greatly prefer flies or cryptic larvæ.—E. B. P.]

14. RECORDS OF ATTACKS ON BUTTERFLIES, ETC., BY WILD BURMESE BIRDS, BY COLONEL C. T. BINGHAM.

[Colonel Bingham has kindly sent me the following extracts from his 1878 diaries, for incorporation in the present memoir.—E. B. P.]

“April 23.—Marched from Kawkaraik to Thinganyinaung, fourteen miles. Started about 7.45, rather late as there was some difficulty in collecting the elephants this morning. . . . The road, a mere jungle path, followed the course of the Akya Chaung, a feeder of the Haundraw River, and crossed the little stream some twenty or more times in the first six or seven miles before turning up the hill to the Taungyah Pass in the Dawnat Range. From the outskirts of Kawkaraik right up to Thinganyinaung on the other side of the pass, the road goes through dense evergreen forest, and consequently the collecting is very good on this road, both for insects and birds. To-day, the day being hot, butterflies, bees, and dragon-flies swarmed, and at every opening of the Chaung I found crowds seated on the damp sand apparently sucking up the moisture. Collecting as I went, it was past 11 o'clock before I got to the foot of the Pass. I was hot and a bit tired, so I sat down on a fallen tree to rest, just before crossing the Akya Chaung for the last time. I had not been seated many minutes looking at the swarms of butterflies, bees, and dragon-flies, which were flitting about or sitting on the sands, when my attention was attracted by a bird, a bee-eater (*Merops swinhoëi*), which swooping down from a tree overhead caught a butterfly, a *Cyrestis*, within a few paces of me. The bee-eater seemed to catch the butterfly with ease, and I distinctly heard the snap of its bill. Then holding the butterfly crossways the bird flew back to the

tree, and sat still for a minute or so, then came a little jerk of the head, and the wings of the butterfly came fluttering to the ground, while the body was gulped. On the same branch some four or five more bee-eaters of the same species were seated, and as I sat very still, one after another these birds swooped close to me, sometimes after a butterfly, sometimes at a bee or a dragon-fly. More than once I saw a bird miss a butterfly, when the latter would dodge and try to get away among the bushes of the dense undergrowth around, but only very seldom was this successful, for the bird would hover and twist and turn in hot pursuit, and generally managed to catch the insect. I was greatly interested, for though I had seen both bee-eaters and king-crows (*Dicrurus*) go for butterflies and moths, this was the first time I had witnessed a continuous hawking of butterflies on the part of birds. I sat for nearly half-an-hour watching. The birds seemed to swoop only for the insects flying about, never at those on the ground. A drove of pack bullocks with their shouting Shan drivers coming down the road frightened the bee-eaters, and they flew off. I got up and prepared to start up-hill, when it struck me that it would be interesting to see what species of butterfly had been taken by the bee-eaters, so I set to work and collected all the loose wings I could find. I did not get many, for the undergrowth was very dense, and the wings dropped in it were difficult to find. Also the place swarmed with ants, I could see them on all sides carrying off whole wings, or portions bitten out of them. Again I was pressed for time, so that I managed to get together only nineteen wings, most of them odd ones luckily. . . . I have just sorted out and put away my collections of the day. The butterflies hawked and eaten by the bee-eaters belong to the following species—*Papilio erithonius*, *P. sarpedon*, *Charaxes athamas*, *Cyrestis thyodamus*, and *Terias hecabe*. A meagre list, for I am certain I saw the bee-eaters swoop for and catch *Prioneris*, *Hebomoia*, *Junonia*, and *Precis*. I also particularly noticed that the birds never went for a *Danais* or *Euphlea*, or for *Papilio macareus*, and *P. xenocles*, which are mimics of *Danais*, though two or three species of *Danais*, four or five of *Euphlea*, and the two above-mentioned mimicking *Papilios* simply swarmed along the whole road.”*

* I did not then realize the importance of my find, or I should have spared more time for the collection of the fallen wings of the butterflies, and taken more care of them.—C. T. B.

Looking through my diaries I find more scattered notes of my having witnessed birds swoop for and catch butterflies and moths, but these were solitary incidents, and only slight mention is made of them in the diaries with one exception, which is given below—

“*Camp Wabosakhan*, December 3. . . . Going through some fairly open jungle close to the main road I put up a *Melanitis zitenius*, which fluttered across the road and was swooped at by a king-crow (*Dicrurus*) but missed; the butterfly dodged, got to the other side of the road and dropped to the ground among the herbage and fallen leaves, as is the habit of *Melanitis*. The king-crow hovered for a minute not three feet from the ground over the exact spot where I had noticed the butterfly drop, failed to see it, flew off, but returned and again hovered over the spot, but was again unsuccessful, and flew up to a tree. I went forward very cautiously, and having carefully noted the spot where the butterfly had dropped, was enabled to make it out, but not till after fully ten minutes of patient and very cautious looking. The *Melanitis* was there among dead leaves, its wings folded and looking for all the world a dead dry leaf itself. With regard to *Melanitis*, I have not seen it recorded anywhere that the species of this genus when disturbed fly a little way, drop suddenly into the undergrowth with closed wings and invariably lie a little askew and slanting, which still more increases their likeness to a dead leaf casually fallen to the ground.

“Only once again did I see the systematic hawking of butterflies by birds. This second occurrence was also by bee-eaters; this time it was the large *Merops philippinus*. I had been up in the Salween forests beyond the great rapids, and had managed to get a bad bout of fever which necessitated my returning to Moulmein, my head-quarters. It was a hot steamy day in October, and I was lying with the hot fever fit on me in the boat on the Salween below Shwègon, when I noticed clouds of butterflies, chiefly *Catopsilia*, migrating, crossing the Salween from east to west in a continuous stream. These were being persistently hawked by the *Merops*, mixed with which were some king-crows.”

With regard to *Microhierax cœrulescens* catching butterflies, I find the following note :—

“*March 20, 1881.* . . . Passing through a taungyah on my way back to camp I noticed a number of butterflies,

some seated, some hovering round a spot where some Karens had been eating their food, and had left some rice and gnapi scattered on the ground. I was approaching the butterflies cautiously to see what species were there, when a small black-and-white bird came down from a tree close by and perched on the ground close to one little mob of butterflies busy feeding away on the gnapi. I recognized the bird at once as the pigmy hawk (*Microhierax cærulescens*). His coming flop down close to the butterflies disturbed some, but not all. A few were too intent on their meal. The hawk sat for fully two minutes looking at the butterflies, then he crouched as birds do when they are about to rise, and next moment with a quick snatch he had taken a butterfly in his claws and was flying to the nearest tree. Though I was watching intently I am quite unable to say whether he took one of the sitting butterflies or one that was flying about. I watched him eat the insect, which he held with his claw against the branch on which he was seated, and he tore at it just as the larger hawks do with their prey. I wanted a specimen of the bird, so shot it, and afterwards picked up the wings of the butterfly he had eaten; it was a *Papilio sarpedon*."

N.B.—That same specimen of *Microhierax* is now, I believe, in a small case by itself in the bird gallery of the British Museum.

[Colonel C. T. Bingham has also made some interesting observations on the use of insects' wings as a pad at the bottom of a hole in a tree, forming the nest of this same species of bird, the falconet *Microhierax cærulescens*, Linn. (*M. cutolmus*, Hodgs.). The following account is quoted from "Stray Feathers" (vol. v, No. 2, June 1877, pp. 79-81). The observations were made in the "Government Teak Reserve on the Sinzaway Chaung, a feeder of the Younzaleen River, which it enters about two days' march below our frontier station of Pahpoo in Tenasserim." The nest was found on April 14, "in a hole on the underside of a decayed bough of a mighty Pymma tree (*Lagerstræmia Flos Regina*)." The four eggs were found to be "stained by resting on the broken leaves, wings of dragonflies, and bits of wood which composed the nest." The editor appends to this account a note of Davidson's which had been in his possession for years. On March 25 the nest of *Microhierax fringillarius*, Drap., was examined. It had been made in a hole in a dry tree in an old taungyah (clearing) "near Bankasoon at the extreme south of Tenas-

serim." "At the bottom of the hole, which was about eighteen inches deep, was a soft pad composed of flies and butterflies' wings, mixed with small pieces of rotten wood."

In March 1878, Col. Bingham found a second nest of the same species (*M. ceruleseens*) which he sent to the late Mr. de Nicéville in order to ascertain the species of insects which had been made use of. Mr. de Nicéville wrote as follows:—

"The fragments of butterfly wings you send are as follows:—

- No. 1. Portion of fore-wing of *Papilio caunus*.
- „ 2. Fore- and hind-wing of *Mycalesis perscus*.
- „ 3. Hind-wing of *Papilio crithonius*.
- „ 5. Portion of fore-wing of *Junonia orithyia*.
- „ 4, 6, 7, 8, 9, too fragmentary to make out, but seem to belong to some species of the *Lycænidæ*.
- „ 10. Half of fore-wing of *Charaxes* sp. ?.
- „ 11. Portion of hind-wing of *Symphædra dirtea* ♀.
- „ 12 to 17 are the wings of dragon-flies.”*

A passage from another letter of Mr. de Nicéville to Colonel Bingham indicates in a different manner the severity of the nearly unseen struggle for existence which butterflies of certain genera pass through. The wings sent by Col. Bingham were found by him in 1888. Mr. de Nicéville wrote concerning them:—

“See p. 275 of vol. ii of my ‘Butterflies.’ Ferguson found a single wing of *Charaxes schreiberi* in Travancore on the ground. It is curious that the only record so far of the

* In the *Zoologist* (4th Series, vol. v, 1901, pp. 224, 225) Colonel Bingham states that he found, on April 23, 1899, a nest of the same species of pigmy falcon in a hole on the under-side of a branch of a dead tree in a deserted taungyah alongside the high-road leading from Thabeitkyin, on the banks of the Irrawaddy above Mandalay, to Mogok, the site of the famous Ruby Mines of Upper Burma. The hole had evidently been made by a Barbet. It was 15 inches long, and at the end was slightly enlarged into an oval chamber containing “a fairly firm pad of chips of wood, a few leaves, with an upper stratum quite two inches thick, composed almost entirely of the wings of cicadas, with a few butterfly and moth wings interspersed therein.” There were no eggs or nestlings. “Further south, in Tenasserim,” Colonel Bingham continues (l. c. p. 225), “I found the eggs of this falcon in a precisely similar situation early in April, as well as I can remember. That nest was composed almost entirely of butterfly wings.” Colonel Bingham informs me that the last-named nest was the one, described above in the text, which was found in March 1878, and furnished the wings named by de Nicéville.

same species from Burma should be the three wings you send me, which you say you found on the ground."—
E. B. P.]

15. GUY A. K. MARSHALL'S INDIRECT EVIDENCE OF THE
ATTACKS UPON BUTTERFLIES. (E. B. P.)

At the meeting of the Entomological Society held on August 1, 1883, Professor Meldola communicated some observations made by Dr. Fritz Müller in Brazil (Proc. Ent. Soc. Lond., p. xxiii), together with specimens of distasteful conspicuous butterflies with wings notched or otherwise injured apparently by birds. Dr. Fritz Müller's well-known theory, which accounts for synaposematic resemblances, implies that even distasteful butterflies are experimentally attacked by young enemies. That such attacks are made had been doubted, and Professor Meldola therefore wrote to Dr. Müller asking him to collect observations upon the point. A specimen of *Heliconius eucrate* sent by him to Professor Meldola was described (Ann. Mag. Nat. Hist., Dec. 1882, p. 419) as having a symmetrical, jagged notch on both fore-wings; and on Aug. 1, 1883, Professor Meldola exhibited examples of thirty-six notched and shorn specimens of *Acraea* [*Actinote*] *thalia*, obtained in one week by the great German naturalist. These examples and the *Heliconius* have been presented by Professor Meldola to the Hope Department, where they may be seen beside numerous similar specimens from very different parts of the world, including those figured on the accompanying Plates IX, X, and XI. Similar observations upon Bornean butterflies, including four *Danainæ*, have been published by S. B. J. Skertchley (Ann. Mag. Nat. Hist. (6) iii, 1889, pp. 477-485), while W. L. Distant has described unsymmetrical injuries, apparently caused by a bird, in the wings of *Limnas chrysippus* ("Naturalist in Transvaal," 1889, p. 65). I noticed the same thing (1888) in many specimens of *Colias cduca* captured in Madeira ("Colours of Animals," London, 1890, p. 206; see also Roland Trimen's Presidential Address to the Entomological Society of London, Jan. 19, 1898, where many of these and other records are collected and commented upon).

It seemed of importance to obtain this kind of evidence from as many parts of the world as possible and on a large scale. I therefore asked Mr. Marshall if he would kindly